



CloudSat/CALIPSO Validation Experiment (CC VEx) Mission Report: Friday July 30, 2006

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Mission Summary

The NASA Dryden ER2 and the WMI Lear Jet conducted comparison flights with the Cloudsat and CALIPSO (CC) satellite missions along a track extending off the coast of the southeastern US. The mission was noteworthy for observing a wide spectrum of cloud and aerosol features. Clouds along the satellite track consisted of thick anvil outflow, developing convective elements, thin anvil cirrus, altocumulus, and deep precipitating clouds. Thin cirrus overlying mixed phased clouds with precipitating snow were sampled in situ by the Lear Jet during spiral maneuvers conducted in conjunction with the ER2 approximately 50 NM west of the track center point. A deep layer of aerosols extending to 5 km altitude was also observed at the southern portion of the satellite track.

The NASA LaRC B-200 did not participate in today's mission.

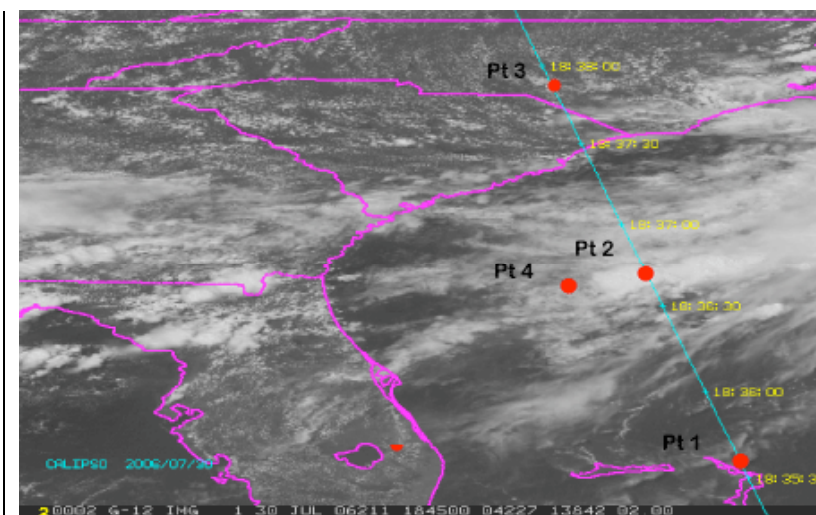


Figure 1. GOES Visible image at 18:45 UTC on July 30, 2006 (Courtesy Bill Smith Jr., LaRC). The CC track was sampled by the ER2 between approximately Pt1 and Pt3. The aircraft/satellite coincidence was planned for Pt 2.

Science Objectives:

1. To obtain coordinated aircraft/satellite observations above convective clouds to examine the instrument performance, detection thresholds, and calibration during daylight for the CALIPSO lidar and CloudSat radar.
2. To obtain in situ ice/water cloud measurements with the Lear Jet coincident with the ER-2 and A-train overpasses.

Flight Plan:

The portion of the CC orbit track sampled by the aircraft extended northwestward from a southern point near Abaco Island, Bahamas Islands (PT 1: 27° 03' N, 77° 18' W), across the South Carolina coast, and to a northern location in North Carolina (Pt 3: 34° 52' N, 79° 22' W). The ER2 departed from Robbins Air Force Base (RAFB) at 15:45 UTC and flew northeastward where it intersected the CC track at the northern point of the track at flight altitude of approximately 65,000 ft. The aircraft turned and headed southeastward along track until it reached Abaco Island. During this transit, the ER2 pilot reported intensive convection developing beneath the aircraft near the mid point of the flight leg. At the southern end of the leg, the pilot reported thin cirrus and brown haze above the sea surface. The aircraft returned northward along the same track. On this flight leg, the ER2 passed the planned coincident point at 18:35:29 UTC (Pt 2: 30° 40' N, 78° 13' W). After completing the northward leg, the ER2 flew to a new location (Pt 4: 30° 49' N, 79° 18' W) where it conducted 3 overpasses in a cloverleaf pattern over a period of about an hour (see Fig 2). Profiled in situ cloud observations were acquired by the WMI Lear Jet at this location. There was no convection at this new location.

The WMI Lear Jet took off about 17:20 UTC and intersected the CC track slightly north of the satellite coincident location (the aircraft was diverted slightly north because of an intense convective cell at the planned satellite coincident location). The aircraft flew north along the path during the satellite overpass for approximately 50 nm at an altitude of approximately 39,000 ft. It then turned and flew southeastward along the same track passing through the edge of a convective cell to a location slightly southeastward of the coincident location before heading west to the new rendezvous point with the ER2. At this location, the aircraft spiraled downward to 19,000 ft through a layer of cirrus and a layer of altocumulus. It further ascended back to 39,000 ft and descended again down to 15,000 ft before returning to RAFB.

The ER2 returned to RAFB at 21:45 UTC and the Lear Jet returned to RAFB at approximately 22:30 UTC.

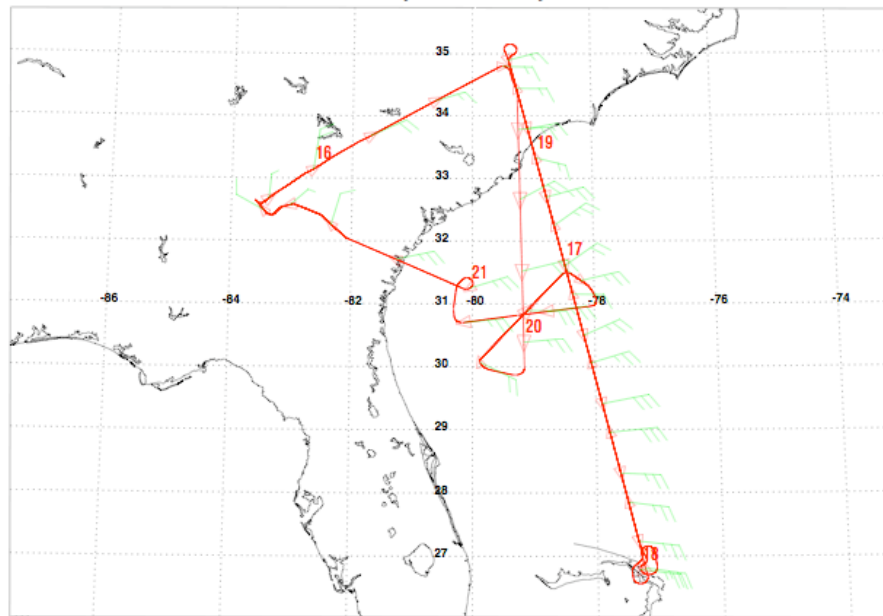


Figure 2. ER2 track for July 30, 2006.

Meteorology:

A weak baroclinic zone extended across southern Georgia and the Florida panhandle into adjacent waters off the Georgia and South Carolina coast. At upper levels off the coast, a sharp upper-level trough line extended NE-SW across the Bahamas. During the morning, remnants of cirrus and altocumulus from the previous day of convection were still present along the baroclinic zone and across the CC track. As noted above, vigorous organized convection developed across the CC track at the mid point during the flights. The ER2 observed rapid cloud development at it passed over the convective cell. No turbulence was reported by the ER2. Further to the south, cirrus was widely present overlaying a deep layer aerosols suspected to have originated from North Africa.

Instrument Status Report:

- NASA Dryden ER-2: science instruments performed nominally.
- WMI Lear Jet: instruments performed nominally during overpass period. Problems with Cloud Droplet Probe afterwards.

Quicklook Results:

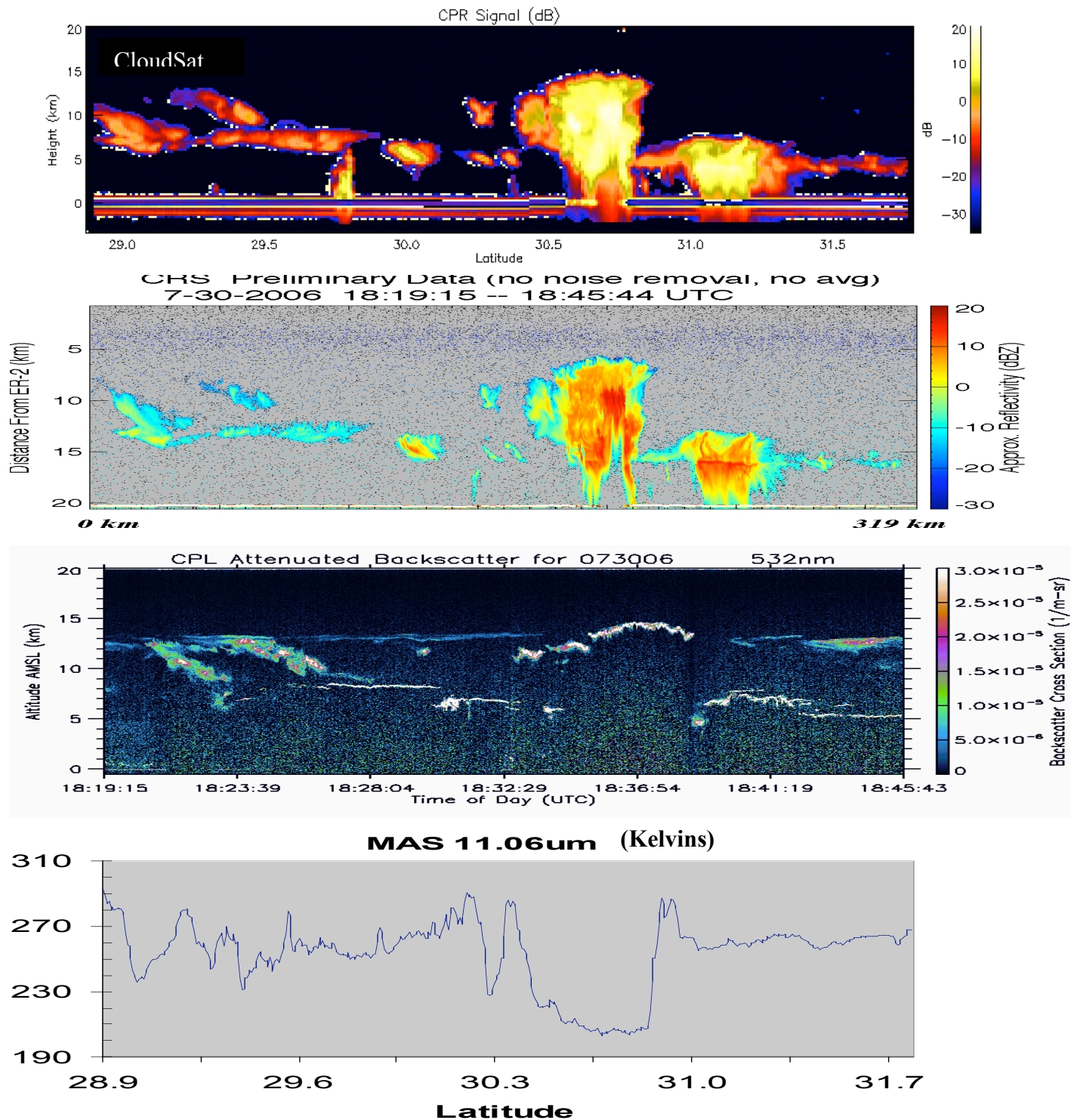


Figure 3. Quicklook CloudSat, CRS, CPL, and MAS observations for a segment of approximately 24 minutes along the track and centered about the aircraft/satellite coincident point for July 30, 2006. CloudSat radar imagery courtesy of the CloudSat team. Cloud Radar System courtesy of G. Heymsfield (GSFC). Cloud Profiling Lidar (CPL) measurements courtesy of M.

McGill (GSFC) and MODIS Airborne Simulator (MAS) observations courtesy of J. Meyers/R. Dominguez (Ames). Note: CALIPSO data had not been processed at time that this report was prepared.

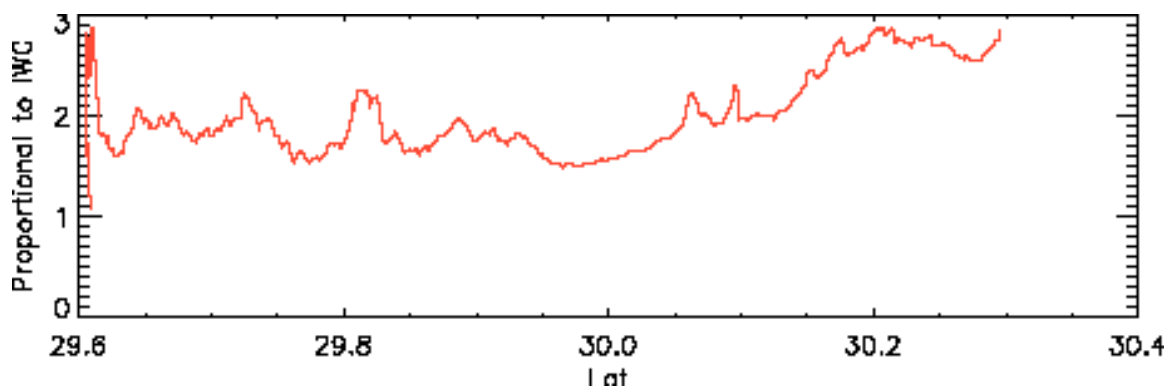


Figure 4. Measurements of condensed water content from the Lear Jet along the CC satellite track during and immediately after the overpass coincidence. Measurements were sampled at 12.5 km. Data courtesy of A. Heymsfield (NCAR).

The CC-VEX website can be found within the Mission Data section of the NASA Suborbital site <http://suborbital.nasa.gov/media/index.html>